

REMARKS

Claims 1 and 9-20 are all the claims presently pending in the application. Claims 1 and 9 are amended to more clearly define the invention and claims 19-20 are added. Claims 1 and 14 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Claims 1-4, 6-7, 9-12, and 14-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Borle reference in view of the Kram et al. reference. Claims 5, 8, 13, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the Borle reference in view of the Kram et al. reference and further in view of the Bjorn et al. reference.

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

A first exemplary embodiment of the claimed invention, as defined by, for example, independent claim 1, is directed to an artificial root of a tooth that includes an artificial root body of a tooth including a male thread part to be engaged with a jawbone, and a supporting stage on which an artificial tooth is mounted, and a self tapping part provided on the artificial root body of the tooth. The self tapping part includes a first self tapping part provided at a top of the artificial root body of the tooth, and a second self tapping part having a serrated shape provided on a screw thread of the male thread part. The first self tapping part includes a triple blade. The second self tapping part has a serrated shape in a circumferential spiral-line direction of the screw thread in a spiral shape. The serrated shape is not provided at the first end or a first and a second crest counted from a base end of the screw thread.

A second exemplary embodiment of the claimed invention, as defined by, for example, independent claim 14, is directed to an artificial tooth root that includes a supporting stage at a proximal end, and a root body extending from the proximal end to a distal end. The root body includes a male thread having a saw-shape. Each tooth of the saw-shape is positioned in a circumferential spiral-line direction of an edge of the male thread part

from an adjacent tooth in the saw-shape.

Conventional artificial tooth roots require that a female thread be formed within a jaw bone prior to installation of the tooth root. Therefore, these conventional artificial tooth roots require a complicated, laborious and lengthy surgery.

Further, conventional artificial tooth roots suffer from the problem of the tooth root gradually loosening over time and, therefore, provide an unstable mounting.

In stark contrast, to these conventional artificial tooth roots, the first exemplary embodiment of the claimed invention provides an artificial tooth root with a serrated shape that is not provided at the first end or a first and a second crest counted from a base end of the screw thread. In this manner, the present invention prevents various unfavorable items, such as, for example, a contamination (e.g., bacteria), or food particles in the oral cavity from entering the space between the artificial root of the tooth and the gum-ridge and from reaching the upper end of the artificial root of the tooth.

Further, the second exemplary embodiment of the claimed invention provides an artificial tooth root with a self tapping part including a saw-blade shape. Each tooth of the saw-blade shape is positioned in a circumferential spiral-line direction of an edge of the male thread part from an adjacent tooth in the saw-blade shape. This saw-blade shape provides for self tapping of a female thread simultaneously to the installation of the artificial tooth root thereby significantly reducing the complexity and length of the surgery necessary to install the artificial tooth root.

Further, this saw-blade shape provides spaces between the teeth of the saw-blade shape into which the particles cut from the jaw bone may reside and into which the jaw bone may grow and, thereby, obtain a stable mount.

II. THE PRIOR ART REJECTIONS

A. The Borle reference in view of the Kram et al. reference

Regarding the rejection of claims 1-4, 6-7, 9-12, and 14-17, the Examiner alleges that the Kram et al. reference would have been combined with the Borle reference to form the claimed invention. Applicant submits, however, that these references would not have been combined and, even if combined, do not teach or suggest each of the claimed features.

None of the applied references teaches or suggests the features of the claimed invention including an artificial tooth root with a serrated shape that is not provided at the

first end or a first and a second crest counted from a base end of the screw thread (claim 1). As explained above, this feature is important for preventing various unfavorable items, such as, for example, a contamination (e.g., bacteria), or food particles in the oral cavity from entering the space between the artificial root of the tooth and the gum-ridge and from reaching the upper end of the artificial root of the tooth.

In stark contrast, the Kram et al. reference discloses a threaded fastener that are, in fact, non-smooth serrated teeth 30 on the screw thread of the male thread part (see, for example, Figure 1). However, such serrated teeth are provided only from the first to fifth crests counted from the top, and the rest of the crests have no serrated teeth.

In stark contrast, in accordance with an exemplary embodiment of the present invention, the serrated teeth are provided on all crests, except for the first crest or the first and second crests counted from the base end of the screw thread, and the structures are absolutely different from each other.

According to the present invention, the reason for not providing the non-smooth serrated teeth on the first crest or the first and second crests counted from the base end of the screw thread, is that, as already discussed in the specification of the present invention, there are various unfavorable items such as contamination (e.g., bacteria) or remaining food particles in the oral cavity, and such unfavorable items would enter the space between the artificial tooth and the gum-ridge, and even reach the upper end of the artificial root of the tooth. In such a case, if there are non-smooth serrated teeth existing on the screw thread, such unfavorable items would go into such serrated teeth and remain there.

On the other hand, it is desirable to provide as many non-smooth serrated teeth as possible for the purpose of securing sufficient fixing force. Thus, according to the present invention, the serrated teeth are not provided on the first crest or the first and second crests counted from the base end of the screw thread. This structure is not disclosed at all by the Kram et al. reference.

Additionally, the Examiner alleges that “as to claim 6, 7 and 9, . . . the bearing part (12)” (see Office Action page 2, Claim rejections lines 8-5 from the bottom), but in the case of the Borle reference, as is clear from Figure 1, this is not the structure of providing the serrated teeth on the screw thread of the male thread part, but of providing the serrated teeth on the screw thread of the male thread part, but of providing a kind of “disk-saw” shaped screw thread as is seen from the horizontal section. Thus, the structure is absolutely different.

This point has already been stated in previous arguments.

Further, these references would not have been combined because the proposed modification would destroy an intended purpose, the proposed modification would change the principle of operation, and the Examiner's alleged "motivation" argues against, nor for, such a proposed modification.

One of ordinary skill in the art would not have been motivated to modify the dental obturation screw that is disclosed by the Borle reference to include a saw-tooth or serrated-teeth structure on the threads of the screw as disclosed by the Kram et al. reference.

Firstly, one of ordinary skill in the art would not have been motivated to make such a modification because the proposed modification would change the principle of operation of the Borle reference.

**"THE PROPOSED MODIFICATION CANNOT CHANGE THE
PRINCIPLE OF OPERATION OF A REFERENCE"**

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." (M.P.E.P. 2143.02.VI).

The Borle reference is concerned with reducing "the dangers for the remaining part of a natural tooth during the insertion and subsequent use of an obturation screw." (col. 1, lines 16 – 19).

In particular, the Borle reference discloses using a diamond reamer (Figure 2) which forms a recess in a tooth 2 that "comprises a cylindrical part of a slightly greater diameter than that of the threaded rod 11" of the obturation screw 1. (col. 1, lines 64-66 and col. 2, lines 5-7).

The Borle reference discloses introducing dental cement 15 into the recess and then inserting the dental screw 1 into the cement 15. (Fig. 1 and col. 2, lines 21 – 24). Thus, the Borle reference very clearly teaches that the threads on the cylindrical threaded rod 11 do not cut into, engage, or otherwise cut female threads into the surface of the recess in the tooth 2. Rather, the screw 1 relies upon the bond between the dental cement 15 and the tooth and between the dental cement 15 and the screw to hold the screw in the tooth.

Indeed, the Borle reference makes it very clear that since the screw 1 only contacts the cement 15, that "the insertion of the screw practically results in no radial and axial forces on

the natural tooth part.” (col. 2, lines 26 – 28) which “reduce[s] to a minimum the risks of damaging the roots and the remaining part of a natural tooth” (col. 2, lines 37 – 41).

Thus, the Borle reference does not disclose any self tapping structure at all. To the contrary, the Borle reference actually teaches away from relying upon a self tapping structure to fix the screw.

Further, the Borle reference very clearly teaches relying upon the contact between the bearing point 12 and the tooth to ensure that “The mastication forces acting on the artificial tooth structure fixed onto the obturation screw and transmitted to the same are thus distributed over a relatively large surface in the upper part of the remaining part of the natural tooth by the bearing part 12.” (Col. 2, lines 30 – 34).

In other words, the smooth cylindrical surface of the recess in the tooth, the cement holding the screw in the tooth recess, and the use of a bearing point 12 to bear the mastication forces provides the advantages that are disclosed by the Borle reference.

Clearly, the advantages that are disclosed by the Borle reference are obtained because the Borle reference is based upon the principle of operation where the screw is held in the tooth, not by a mating between threads on the screw and female threads in the tooth, which would result in undesirable radial and axial forces on the tooth, but rather with the use of a smooth walled cylindrical recess, a dental cement and a bearing point 12.

In stark contrast, the threaded fastener that is disclosed by the Krum et al. reference relies upon a completely different and unrelated principle of operation.

The Krum et al. reference discloses a threaded fastener that relies upon an engagement between the male threads on the screw and the female threads that are formed in the substrate to hold the screw into the substrate.

Further, the Krum et al. reference discloses a screw that cuts female threads into the substrate by a cutting and penetrating action. The saw-teeth on the male threads enhance the cutting performance of the threads into the substrate.

Clearly, the Krum et al. reference discloses a screw that relies upon an engagement between the male threads on the screw and the underlying substrate which is cut into and penetrated by the male threads.

One of ordinary skill in the art would not have been motivated to modify the teachings of the Borle reference based upon the disclosure of the Krum et al. reference because such a modification would change the principle of operation of the Borle reference.

The Borle reference very clearly explains that the screw is held into the tooth using cement and that the screw thread is merely provided to hold the screw in the cement and to provide a mechanism whereby the screw may be screwed into the cement. The insertion of the screw into the cement merely needs to overcome the viscosity of the cement and therefore, only applies a minimal amount of radial and axial forces to the tooth to insert the screw into the cement.

The screw of the Borle reference very clearly does not engage the sidewalls of the recess in the tooth in order to hold the screw in the recess. If the threads were to engage the tooth, the radial and axial forces would adversely affect the tooth.

Secondly, one of ordinary skill in the art would not have been motivated to modify the disclosure of the Borle reference based upon the Krum et al. reference “in order to allow the threads of the screw to be inserted or installed more easily.”

Indeed, to the contrary, such a modification would make installation of the threads of the screw more difficult, not easier.

As explained above, the Borle reference discloses forming a smooth sided cylindrical recess in a tooth using a diamond reamer (Fig. 2) which has a diameter that is larger than the screw 1. Thus, the threads on the screw do not contact the sides of the recess. Rather, the threads of the screw slide easily into the dental cement 15 that is provided just before the screw is inserted into the recess.

Modifying the screw of the Borle reference to include a thread that has saw-teeth which would cut into the tooth as disclosed by the Krum et al. reference, would result in a significant radial and axial load being applied to the tooth. A result which is directly contrary to the purposes of the Borle reference and which would make installation more difficult, not easier.

Thus, the Examiner’s alleged “motivation” argues against making the Examiner’s alleged modification, not for making the alleged modification.

Thirdly, one of ordinary skill in the art would not have been motivated to make the alleged modification because to do so would render the device unsatisfactory for its intended purpose.

**“THE PROPOSED MODIFICATION CANNOT RENDER THE
PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE”**

“If [the] proposed modification would render the prior art invention

being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” (M.P.E.P. 2143.01. VI.).

The Borle reference very clearly discloses that one of the intended purposes of the device that is disclosed by the Borle reference is to ensure that “the insertion of the screw practically results in no radial and axial forces on the natural tooth part.” (col. 2, lines 26 – 28) which “reduce[s] to a minimum the risks of damaging the roots and the remaining part of a natural tooth” (col. 2, lines 37 – 41).

Modification of the device that is disclosed by the Borle reference such that it includes threads that cut into and form female threads in the tooth with the assistance of saw-teeth on the male threads as disclosed by the Kram et al. reference would destroy the intended purpose of reducing radial and axial forces, because such would cause an increase in radial and axial forces being applied to the tooth.

One of ordinary skill in the art would not have been motivated to modify the Borle reference based upon the disclosure of the Kram et al. reference as alleged by the Examiner because such a modification would very clearly render the device that is disclosed by the Borle reference unsatisfactory for the intended purpose of reducing radial and axial forces on the tooth.

Fourthly, one of ordinary skill in the art would not have been motivated to modify the screw of the Borle reference based upon the disclosure of the Kram et al. reference because the Borle reference specifically teaches away from making any such modification.

**“References Cannot Be Combined Where Reference Teaches
Away from Their Combination”**

“It is improper to combine references where the references teach away from their combination.” (M.P.E.P. 2145.X.D.2.)

The Borle reference very clearly teaches away from applying any radial and/or axial forces to the tooth when inserting the screw.

The Examiner alleges that it would have been obvious to modify the screw of the Borle reference such that it includes serrated teeth on the threads to make the cutting of the jaw bone easier and thus, make insertion of the screw into the jawbone easier. To modify the screw of the Borle reference in the manner suggested by the Examiner such that it cuts into the tooth would very clearly increase the radial and/or axial forces.

The Borle reference very clearly teaches away from increasing the radial and/or axial forces to the tooth.

Moreover, one of ordinary skill in the art would not have been motivated to combine these references because they are directed to completely different and unrelated problems.

Specifically, the Borle reference is concerned with the problem of reducing the dangers for a remaining part of a tooth during insertion and during subsequent use of an obturation screw. (Col. 1, lines 16 – 19).

In stark contrast, the Kram et al. reference is concerned with the completely different and unrelated problem of providing a saw-teeth structure which enhances the cutting performance of the lead threads of a fastener into a substrate, as well as, being uniquely adapted for insertion into a plurality of different types of substrates. (Col. 1, lines 25 – 35).

One of ordinary skill in the art who was concerned with the problem of reducing the dangers for a remaining part of a tooth during insertion and during subsequent use of an obturation screw, as the Borle reference is concerned, would not have referred to the Kram et al. reference, and vice-versa, because the Kram et al. reference is concerned with the completely different and unrelated problem of providing a saw-teeth structure which enhances the cutting performance of the lead threads of a fastener into a substrate, as well as, being uniquely adapted for insertion into a plurality of different types of substrates.

Thus, these references would not have been combined.

Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 1-4, 6-7, 9-12, and 14-17.

B. The Borle reference in view of the Kram et al. reference and further in view of the Bjorn et al. reference

Regarding the rejection of claims 5, 8, 13, and 18, the Examiner alleges that the Kram et al. reference would have been combined with the Borle reference and further alleges that the Bjorn et al. reference would have been combined with the Kram et al. reference and the Borle reference to form the claimed invention. Applicant submits, however, that these references would not have been combined and, even if combined, the combination would not teach or suggest each and every element of the claimed invention.

As explained above, one of ordinary skill in the art would not have been motivated to modify the dental obturation screw that is disclosed by the Borle reference to include a saw-

tooth or serrated-teeth structure on the threads of the screw as disclosed by the Kram et al. reference.

Further, one of ordinary skill in the art would not have been motivated to modify the Borle reference based upon the Bjorn et al. reference.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify the screw that is disclosed by the Borle reference to include the blades that are disclosed by the Bjorn et al. reference “in order to provide easier insertion into the jawbone and to provide spaces for the bone material that has been cut off so that the material will not block the further insertion of the screw.”

Firstly, as explained above, the Borle reference does not teach inserting a screw into a jawbone. Rather, the Borle reference discloses inserting a screw into the remainder of a tooth. Since the Borle reference discloses inserting a screw into a tooth and not a jawbone, the Borle reference is very concerned about not applying too much radial and/or axial forces to the tooth when inserting the screw.

To avoid applying too much force when inserting the screw into the tooth, the Borle reference does not rely upon a principle of operation of a self tapping insertion. Rather, the Borle reference discloses forming a smooth-walled, cylindrical hole using a diamond reamer (Fig. 2), injecting dental cement into the hole and then screwing the screw into the cement before the cement hardens. In this manner, the screw merely has to overcome the viscosity of the cement to be properly positioned.

Overcoming the viscosity of the cement requires radial and/or axial forces which are MUCH less than what would be required if the threads of the screw were required not only to mate with a female thread in the recess of the tooth, but that the threads of the screw were required to cut those threads into the tooth.

Further, the screw that is disclosed by the Borle reference very clearly does not cut or otherwise form the tooth, let alone a jaw bone. Indeed, the screw of the Borle reference does not cut off any bone material at all.

Thus, since the screw of the Borle reference does not cut any bone material at all, one of ordinary skill in the art would not have been motivated to modify the screw that is disclosed by the Borle reference “in order to provide easier insertion into the jawbone and to provide space for the bone material that has been cut off so that the material will not block the further insertion of the screw” as alleged by the Examiner.

Indeed, there can be no motivation to modify the screw that it disclosed by the Borle reference to cut bone material from the jaw, both because the Borle reference very clearly teaches away from using the screw to cut any material at all because such would put undesirable radial and axial forces onto the tooth, and because the Borle reference does not teach or suggest inserting the screw into the jaw bone at all. Rather, the Borle reference teaches inserting the screw into a tooth.

The screw that is disclosed by the Borle reference does not cut off bone material, therefore, there is no need to prevent any such bone material from blocking further insertion of the screw.

Moreover, one of ordinary skill in the art would not have been motivated to combine these references because they are directed to completely different and unrelated problems.

In stark contrast to the Borle reference and the Kram et al. reference, the Bjorn et al. reference is concerned with the problem of providing a good thread cutting characteristics for a dental implant. (Col. 1, lines 50-55).

One of ordinary skill in the art who was concerned with the problem of reducing the dangers for a remaining part of a tooth during insertion and during subsequent use of an obturation screw, as the Borle reference is concerned, or who was concerned with the problem of providing a saw-teeth structure which enhances the cutting performance of the lead threads of a fastener into a substrate, as well as, being uniquely adapted for insertion into a plurality of different types of substrates, as the Kram et al. reference is concerned, would not have referred to the Bjorn et al. reference, and vice-versa, because the Bjorn et al. reference is concerned with the completely different and unrelated problem of providing a good thread cutting characteristics for a dental implant.

Therefore, the Examiner is respectfully requested to withdraw the rejection of claims 5, 8, 13, and 18.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1 and 9-20, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

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Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date:

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